

$\phi(1020)$ $I^G(J^{PC}) = 0^-(1^{--})$ **$\phi(1020)$ MASS**

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1019.455 ± 0.020 OUR AVERAGE				Error includes scale factor of 1.1.
1019.30 ± 0.02 ± 0.10	105k	AKHMETSHIN 06	CMD2	$0.98\text{--}1.06 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
1019.52 ± 0.05 ± 0.05	17.4k	AKHMETSHIN 05	CMD2	$0.60\text{--}1.38 e^+ e^- \rightarrow \eta \gamma$
$1019.483 \pm 0.011 \pm 0.025$	272k	¹ AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow K_L^0 K_S^0$
1019.42 ± 0.05	1900k	² ACHASOV 01E	SND	$e^+ e^- \rightarrow K^+ K^-$, $K_S K_L, \pi^+ \pi^- \pi^0$
1019.40 ± 0.04 ± 0.05	23k	AKHMETSHIN 01B	CMD2	$e^+ e^- \rightarrow \eta \gamma$
1019.36 ± 0.12		³ ACHASOV 00B	SND	$e^+ e^- \rightarrow \eta \gamma$
1019.38 ± 0.07 ± 0.08	2200	⁴ AKHMETSHIN 99F	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \geq 2\gamma$
1019.51 ± 0.07 ± 0.10	11169	AKHMETSHIN 98	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
1019.5 ± 0.4		BARBERIS 98	OMEG	$450 pp \rightarrow pp 2K^+ 2K^-$
1019.42 ± 0.06	55600	AKHMETSHIN 95	CMD2	$e^+ e^- \rightarrow \text{hadrons}$
1019.7 ± 0.3	2012	DAVENPORT 86	MPSF	$400 pA \rightarrow 4KX$
1019.7 ± 0.1 ± 0.1	5079	ALBRECHT 85D	ARG	$10 e^+ e^- \rightarrow K^+ K^- X$
1019.3 ± 0.1	1500	ARENTON 82	AEMS	$11.8 \text{ polar. } pp \rightarrow KK$
1019.67 ± 0.17	25080	⁵ PELLINEN 82	RVUE	
1019.52 ± 0.13	3681	BUKIN 78C	OLYA	$e^+ e^- \rightarrow \text{hadrons}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1019.63 ± 0.07	12540	⁶ AUBERT,B 05J	BABR	$D^0 \rightarrow \bar{K}^0 K^+ K^-$
1019.8 ± 0.7		ARMSTRONG 86	OMEG	$85 \pi^+ / pp \rightarrow \pi^+ / p 4K p$
1020.1 ± 0.11	5526	⁶ ATKINSON 86	OMEG	$20\text{--}70 \gamma p$
1019.7 ± 1.0		BEBEK 86	CLEO	$e^+ e^- \rightarrow \gamma(4S)$
1019.411 ± 0.008	642k	⁷ DIJKSTRA 86	SPEC	$100\text{--}200 \pi^\pm, \bar{p}, p, K^\pm, \text{on Be}$
1020.9 ± 0.2		⁶ FRAME 86	OMEG	$13 K^+ p \rightarrow \phi K^+ p$
1021.0 ± 0.2		⁶ ARMSTRONG 83B	OMEG	$18.5 K^- p \rightarrow K^- K^+ \Lambda$
1020.0 ± 0.5		⁶ ARMSTRONG 83B	OMEG	$18.5 K^- p \rightarrow K^- K^+ \Lambda$
1019.7 ± 0.3		⁶ BARATE 83	GOLI	$190 \pi^- Be \rightarrow 2\mu X$
1019.8 ± 0.2 ± 0.5	766	IVANOV 81	OLYA	$1\text{--}1.4 e^+ e^- \rightarrow K^+ K^-$
1019.4 ± 0.5	337	COOPER 78B	HBC	$0.7\text{--}0.8 \bar{p}p \rightarrow K_S^0 K_L^0 \pi^+ \pi^-$
1020 ± 1	383	⁶ BALDI 77	CNTR	$10 \pi^- p \rightarrow \pi^- \phi p$
1018.9 ± 0.6	800	COHEN 77	ASPK	$6 \pi^\pm N \rightarrow K^+ K^- N$

1019.7	± 0.5	454	KALBFLEISCH	76	HBC	2.18	$K^- p \rightarrow \Lambda K\bar{K}$
1019.4	± 0.8	984	BESCH	74	CNTR	2	$\gamma p \rightarrow p K^+ K^-$
1020.3	± 0.4	100	BALLAM	73	HBC	2.8–9.3	γp
1019.4	± 0.7		BINNIE	73B	CNTR	$\pi^- p \rightarrow \phi n$	
1019.6	± 0.5	120	⁸ AGUILAR...	72B	HBC	3.9, 4.6	$K^- p \rightarrow \Lambda K^+ K^-$
1019.9	± 0.5	100	⁸ AGUILAR...	72B	HBC	3.9, 4.6	$K^- p \rightarrow K^- p K^+ K^-$
1020.4	± 0.5	131	COLLEY	72	HBC	10	$K^+ p \rightarrow K^+ p \phi$
1019.9	± 0.3	410	STOTTLE...	71	HBC	2.9	$K^- p \rightarrow \Sigma/\Lambda K\bar{K}$

¹ Update of AKHMETSHIN 01D

² From the combined fit assuming that the total $\phi(1020)$ production cross section is saturated by those of $K^+ K^-$, $K_S K_L$, $\pi^+ \pi^- \pi^0$, and $\eta \gamma$ decays modes and using ACHASOV 00B for the $\eta \gamma$ decay mode.

³ Using a total width of 4.43 ± 0.05 MeV. Systematic uncertainty included.

⁴ Using a total width of 4.43 ± 0.05 MeV.

⁵ PELLINEN 82 review includes AKERLOF 77, DAUM 81, BALDI 77, AYRES 74, DEGROOT 74.

⁶ Systematic errors not evaluated.

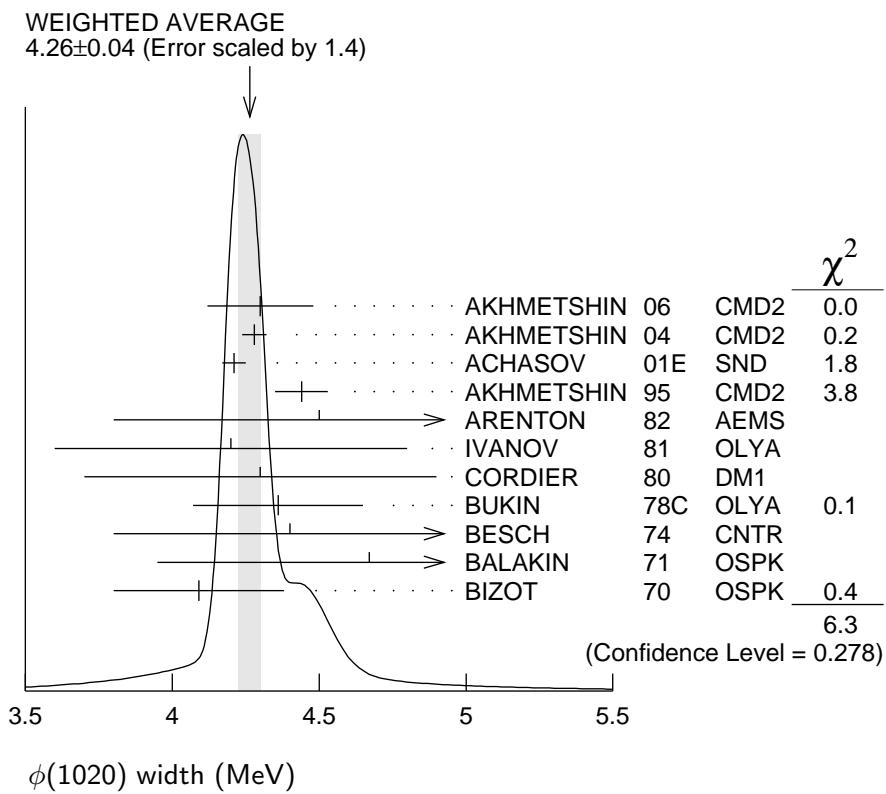
⁷ Weighted and scaled average of 12 measurements of DIJKSTRA 86.

⁸ Mass errors enlarged by us to Γ/\sqrt{N} ; see the note with the $K^*(892)$ mass.

$\phi(1020)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
4.26 ± 0.04 OUR AVERAGE				Error includes scale factor of 1.4. See the ideogram below.
4.30 ± 0.06	± 0.17	105k	AKHMETSHIN 06	CMD2 $0.98\text{--}1.06 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
4.280 ± 0.033	± 0.025	272k	⁹ AKHMETSHIN 04	CMD2 $e^+ e^- \rightarrow K_L^0 K_S^0$
4.21 ± 0.04	1900k	¹⁰ ACHASOV 01E	SND	$e^+ e^- \rightarrow K^+ K^-$, $K_S K_L$, $\pi^+ \pi^- \pi^0$
4.44 ± 0.09	55600	AKHMETSHIN 95	CMD2	$e^+ e^- \rightarrow$ hadrons
4.5 ± 0.7	1500	ARENTON 82	AEMS	11.8 polar. $p p \rightarrow K K$
4.2 ± 0.6	766	¹¹ IVANOV 81	OLYA	$1\text{--}1.4 e^+ e^- \rightarrow K^+ K^-$
4.3 ± 0.6		CORDIER 80	DM1	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
4.36 ± 0.29	3681	¹¹ BUKIN 78C	OLYA	$e^+ e^- \rightarrow$ hadrons
4.4 ± 0.6	984	¹¹ BESCH 74	CNTR	$2 \gamma p \rightarrow p K^+ K^-$
4.67 ± 0.72	681	¹¹ BALAKIN 71	OSPK	$e^+ e^- \rightarrow$ hadrons
4.09 ± 0.29		BIZOT 70	OSPK	$e^+ e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.28 ± 0.13	12540	¹² AUBERT,B 05J	BABR	$D^0 \rightarrow \bar{K}^0 K^+ K^-$
4.45 ± 0.06	271k	DIJKSTRA 86	SPEC	100 π^- Be
3.6 ± 0.8	337	¹¹ COOPER 78B	HBC	$0.7\text{--}0.8 \bar{p} p \rightarrow K_S^0 K_L^0 \pi^+ \pi^-$
4.5 ± 0.50	1300	^{11,12} AKERLOF 77	SPEC	400 $p A \rightarrow K^+ K^- X$

4.5 ± 0.8	500 ^{11,12} AYRES	74 ASPK 3–6 $\pi^- p \rightarrow K^+ K^- n, K^- p \rightarrow K^+ K^- \Lambda/\Sigma^0$
3.81 ± 0.37	COSME	74B OSPK $e^+ e^- \rightarrow K_L^0 K_S^0$
3.8 ± 0.7	¹¹ BORENSTEIN	72 HBC 2.18 $K^- p \rightarrow K\bar{K}n$



$\phi(1020)$ width (MeV)

⁹ Update of AKHMETSHIN 01D

¹⁰ From the combined fit assuming that the total $\phi(1020)$ production cross section is saturated by those of $K^+ K^-$, $K_S K_L$, $\pi^+ \pi^- \pi^0$, and $\eta \gamma$ decays modes and using ACHASOV 00B for the $\eta \gamma$ decay mode.

¹¹ Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.

¹² Systematic errors not evaluated.

$\phi(1020)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
$\Gamma_1 K^+ K^-$	(49.3 ± 0.6) %	S=1.2
$\Gamma_2 K_L^0 K_S^0$	(34.0 ± 0.5) %	S=1.1
$\Gamma_3 \rho \pi + \pi^+ \pi^- \pi^0$	(15.23 ± 0.35) %	S=1.2
$\Gamma_4 \rho \pi$		
$\Gamma_5 \pi^+ \pi^- \pi^0$		
$\Gamma_6 \eta \gamma$	(1.305 ± 0.025) %	S=1.2
$\Gamma_7 \pi^0 \gamma$	(1.24 ± 0.07) $\times 10^{-3}$	
$\Gamma_8 \ell^+ \ell^-$		

Γ_9	$e^+ e^-$	$(2.98 \pm 0.04) \times 10^{-4}$	S=1.1
Γ_{10}	$\mu^+ \mu^-$	$(2.85 \pm 0.19) \times 10^{-4}$	
Γ_{11}	$\eta e^+ e^-$	$(1.15 \pm 0.10) \times 10^{-4}$	
Γ_{12}	$\pi^+ \pi^-$	$(7.3 \pm 1.3) \times 10^{-5}$	
Γ_{13}	$\omega \pi^0$	$(5.2 \begin{array}{l} +1.3 \\ -1.1 \end{array}) \times 10^{-5}$	
Γ_{14}	$\omega \gamma$	< 5 %	CL=84%
Γ_{15}	$\rho \gamma$	$< 1.2 \times 10^{-5}$	CL=90%
Γ_{16}	$\pi^+ \pi^- \gamma$	$(4.1 \pm 1.3) \times 10^{-5}$	
Γ_{17}	$f_0(980) \gamma$	$(1.11 \pm 0.07) \times 10^{-4}$	
Γ_{18}	$\pi^0 \pi^0 \gamma$	$(1.09 \pm 0.06) \times 10^{-4}$	
Γ_{19}	$\pi^+ \pi^- \pi^+ \pi^-$	$(3.9 \begin{array}{l} +2.8 \\ -2.2 \end{array}) \times 10^{-6}$	
Γ_{20}	$\pi^+ \pi^+ \pi^- \pi^- \pi^0$	$< 4.6 \times 10^{-6}$	CL=90%
Γ_{21}	$\pi^0 e^+ e^-$	$(1.12 \pm 0.28) \times 10^{-5}$	
Γ_{22}	$\pi^0 \eta \gamma$	$(8.3 \pm 0.5) \times 10^{-5}$	
Γ_{23}	$a_0(980) \gamma$	$(7.6 \pm 0.6) \times 10^{-5}$	
Γ_{24}	$\eta'(958) \gamma$	$(6.23 \pm 0.21) \times 10^{-5}$	
Γ_{25}	$\eta \pi^0 \pi^0 \gamma$	$< 2 \times 10^{-5}$	CL=90%
Γ_{26}	$\mu^+ \mu^- \gamma$	$(1.4 \pm 0.5) \times 10^{-5}$	
Γ_{27}	$\rho \gamma \gamma$	$< 5 \times 10^{-4}$	CL=90%
Γ_{28}	$\eta \pi^+ \pi^-$	$< 1.8 \times 10^{-5}$	CL=90%
Γ_{29}	$\eta \mu^+ \mu^-$	$< 9.4 \times 10^{-6}$	CL=90%

CONSTRAINED FIT INFORMATION

An overall fit to 25 branching ratios uses 72 measurements and one constraint to determine 12 parameters. The overall fit has a $\chi^2 = 82.4$ for 61 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	-80									
x_3	-62 3									
x_6	-28 21 13									
x_7	-14 11 7 10									
x_9	59 -50 -31 -43 -23									
x_{10}	-9 7 4 6 3 -14									
x_{12}	-4 3 2 3 2 -7 1									
x_{17}	0 0 0 0 0 0 0 0									
x_{19}	-1 1 1 1 0 -2 0 0 0									
x_{23}	0 0 0 0 0 0 0 0 0									
x_{24}	-9 7 4 33 3 -14 2 1 0 0									
	x_1	x_2	x_3	x_6	x_7	x_9	x_{10}	x_{12}	x_{17}	x_{19}
x_{24}	0									
	x_{23}									

$\phi(1020)$ PARTIAL WIDTHS

$\Gamma(\eta\gamma)$

Γ_6

VALUE (keV) DOCUMENT ID TECN COMMENT

• • • We do not use the following data for averages, fits, limits, etc. • • •

$58.9 \pm 0.5 \pm 2.4$ ACHASOV 00 SND $e^+ e^- \rightarrow \eta\gamma$

$\Gamma(\pi^0\gamma)$

Γ_7

VALUE (keV) DOCUMENT ID TECN COMMENT

• • • We do not use the following data for averages, fits, limits, etc. • • •

$5.40 \pm 0.16^{+0.43}_{-0.40}$ ACHASOV 00 SND $e^+ e^- \rightarrow \pi^0\gamma$

$\Gamma(\ell^+\ell^-)$

Γ_8

VALUE (keV) DOCUMENT ID TECN COMMENT

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.320 \pm 0.017 \pm 0.015$ ¹³AMBROSINO 05 KLOE 1.02 $e^+ e^- \rightarrow \mu^+ \mu^-$

$\Gamma(e^+ e^-)$ Γ_9

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
1.27±0.04 OUR EVALUATION				
1.32±0.05±0.03		14 AMBROSINO 05	KLOE	$1.02 \text{ } e^+ e^- \rightarrow e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.27±0.03	272k	15 AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow K_L^0 K_S^0$
$(\Gamma(e^+ e^-) \times \Gamma(\mu^+ \mu^-))^{1/2}$				
$(\Gamma_9 \Gamma_{10})^{1/2}$				
VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
1.320±0.018±0.017		AMBROSINO 05	KLOE	$1.02 \text{ } e^+ e^- \rightarrow \mu^+ \mu^-$
13 Weighted average of Γ_{ee} and $\sqrt{\Gamma_{ee}\Gamma_{\mu\mu}}$ from AMBROSINO 05 assuming lepton universality.				
14 From forward-backward asymmetry and using $\Gamma_{\text{total}} = 4.26 \pm 0.05 \text{ MeV}$ from the 2004 edition of this Review.				
15 Using $B(\phi \rightarrow K_L^0 K_S^0) = 0.337 \pm 0.005$ and $\Gamma_{\text{total}} = 4.26 \pm 0.05 \text{ MeV}$. Update of AKHMETSHIN 99D.				

$$\phi(1020) \Gamma(i) \Gamma(e^+ e^-) / \Gamma^2(\text{total})$$

 $\Gamma(e^+ e^-) \times \Gamma(K^+ K^-) / \Gamma_{\text{total}}^2$ $\Gamma_9 \Gamma_1 / \Gamma^2$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
14.67±0.33 OUR FIT Error includes scale factor of 1.2.				
13.93±0.14±0.99	1000k	16 ACHASOV 01E	SND	$e^+ e^- \rightarrow K^+ K^-$, $K_S K_L, \pi^+ \pi^- \pi^0$

 $\Gamma(e^+ e^-) \times \Gamma(K_L^0 K_S^0) / \Gamma_{\text{total}}^2$ $\Gamma_9 \Gamma_2 / \Gamma^2$

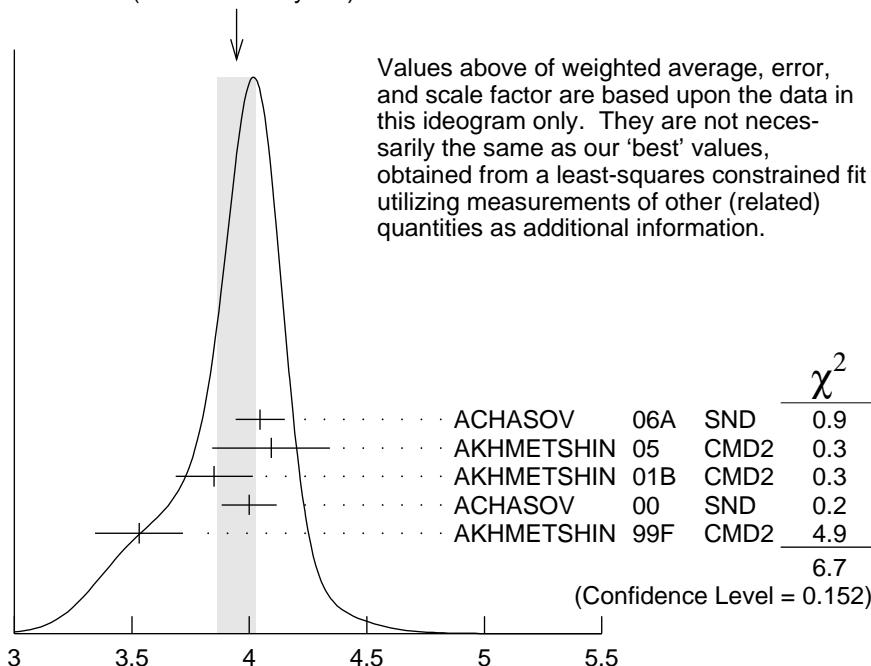
VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
10.12±0.13 OUR FIT				
10.06±0.16 OUR AVERAGE				
10.01±0.04±0.17	272k	17 AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow K_L^0 K_S^0$
10.27±0.07±0.34	500k	16 ACHASOV 01E	SND	$e^+ e^- \rightarrow K^+ K^-$, $K_S K_L, \pi^+ \pi^- \pi^0$

 $\Gamma(e^+ e^-) \times [\Gamma(\rho\pi) + \Gamma(\pi^+ \pi^- \pi^0)] / \Gamma_{\text{total}}^2$ $\Gamma_9 \Gamma_3 / \Gamma^2$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
4.54 ±0.10 OUR FIT Error includes scale factor of 1.1.				
4.46 ±0.12 OUR AVERAGE				
4.51 ±0.16 ±0.11	105k	AKHMETSHIN 06	CMD2	$0.98-1.06 \text{ } e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
4.30 ±0.08 ±0.21		AUBERT,B 04N	BABR	$10.6 \text{ } e^+ e^- \rightarrow \pi^+ \pi^- \pi^0 \gamma$
4.665±0.042±0.261	400k	16 ACHASOV 01E	SND	$e^+ e^- \rightarrow K^+ K^-$, $K_S K_L, \pi^+ \pi^- \pi^0$
4.35 ±0.27 ±0.08	11169	18 AKHMETSHIN 98	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$

$\Gamma(e^+ e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}^2$	$\Gamma_9 \Gamma_6/\Gamma^2$
<i>VALUE (units 10^{-6})</i>	<i>EVTS</i>
3.89 ± 0.07 OUR FIT	Error includes scale factor of 1.2.
3.95 ± 0.08 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.
4.046 $\pm 0.056 \pm 0.089$	33k 19 ACHASOV 06A SND $e^+ e^- \rightarrow \eta\gamma$
4.093 $\pm 0.040 \pm 0.247$	17.4k 20 AKHMETSHIN 05 CMD2 0.60-1.38 $e^+ e^- \rightarrow \eta\gamma$
3.850 $\pm 0.041 \pm 0.159$	23k 21,22 AKHMETSHIN 01B CMD2 $e^+ e^- \rightarrow \eta\gamma$
4.00 $\pm 0.04 \pm 0.11$	23 ACHASOV 00 SND $e^+ e^- \rightarrow \eta\gamma$
3.53 $\pm 0.08 \pm 0.17$	2200 24,25 AKHMETSHIN 99F CMD2 $e^+ e^- \rightarrow \eta\gamma$

WEIGHTED AVERAGE
 3.95 ± 0.08 (Error scaled by 1.3)



$$\Gamma(e^+ e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}^2 \quad \Gamma_9 \Gamma_6/\Gamma^2$$

$\Gamma(e^+ e^-) \times \Gamma(\pi^0\gamma)/\Gamma_{\text{total}}^2$	$\Gamma_9 \Gamma_7/\Gamma^2$
<i>VALUE (units 10^{-7})</i>	<i>EVTS</i>
3.71 ± 0.21 OUR FIT	
3.71 ± 0.21 OUR AVERAGE	
3.75 $\pm 0.11 \pm 0.29$	18680 AKHMETSHIN 05 CMD2 0.60-1.38 $e^+ e^- \rightarrow \pi^0\gamma$
3.67 $\pm 0.10^{+0.27}_{-0.25}$	26 ACHASOV 00 SND $e^+ e^- \rightarrow \pi^0\gamma$

$\Gamma(e^+ e^-) \times \Gamma(\mu^+ \mu^-)/\Gamma_{\text{total}}^2$

$\Gamma_9 \Gamma_{10}/\Gamma^2$

VALUE (units 10^{-8})

DOCUMENT ID

TECN

COMMENT

8.5 ±0.6 OUR FIT

8.8 ±0.9 OUR AVERAGE

Error includes scale factor of 1.5. See the ideogram below.

$8.36 \pm 0.59 \pm 0.37$

ACHASOV 01G SND $e^+ e^- \rightarrow \mu^+ \mu^-$

$9.9 \pm 1.4 \pm 0.9$

²⁴ ACHASOV 99C SND $e^+ e^- \rightarrow \mu^+ \mu^-$

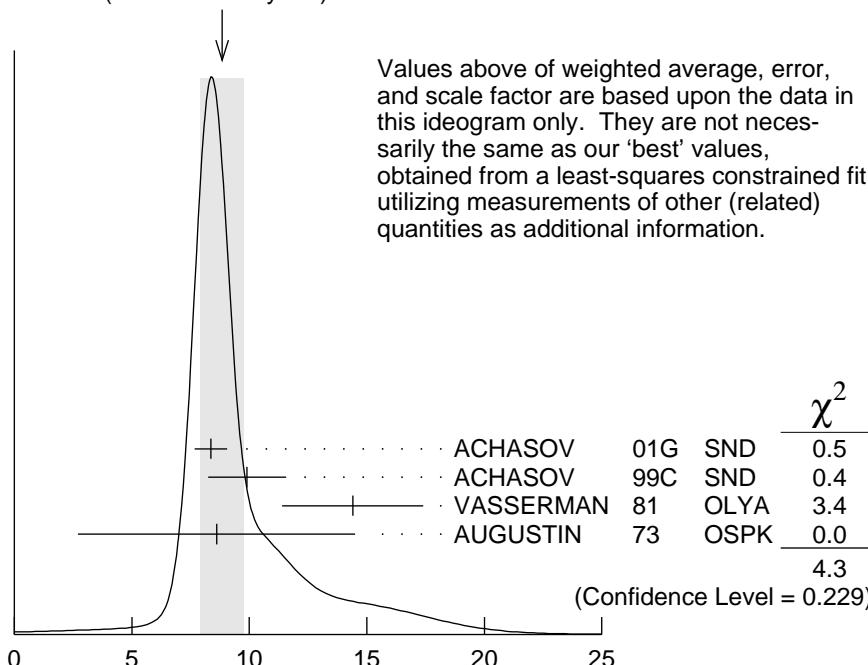
14.4 ± 3.0

¹⁸ VASSERMAN 81 OLYA $e^+ e^- \rightarrow \mu^+ \mu^-$

8.6 ± 5.9

¹⁸ AUGUSTIN 73 OSPK $e^+ e^- \rightarrow \mu^+ \mu^-$

WEIGHTED AVERAGE
 8.8 ± 0.9 (Error scaled by 1.5)



$\Gamma(e^+ e^-) \times \Gamma(\mu^+ \mu^-)/\Gamma_{\text{total}}^2$

$\Gamma_9 \Gamma_{10}/\Gamma^2$

$\Gamma(e^+ e^-) \times \Gamma(\pi^+ \pi^-)/\Gamma_{\text{total}}^2$

$\Gamma_9 \Gamma_{12}/\Gamma^2$

VALUE (units 10^{-8})

DOCUMENT ID

TECN

COMMENT

2.2 ±0.4 OUR FIT

2.2 ±0.4 OUR AVERAGE

$2.1 \pm 0.3 \pm 0.3$

²⁴ ACHASOV 00C SND $e^+ e^- \rightarrow \pi^+ \pi^-$

$1.95^{+1.15}_{-0.87}$

¹⁸ GOLUBEV 86 ND $e^+ e^- \rightarrow \pi^+ \pi^-$

$6.01^{+3.19}_{-2.51}$

¹⁸ VASSERMAN 81 OLYA $e^+ e^- \rightarrow \pi^+ \pi^-$

$\Gamma(e^+ e^-) \times \Gamma(\pi^+ \pi^- \pi^+ \pi^-)/\Gamma_{\text{total}}^2$

$\Gamma_9 \Gamma_{19}/\Gamma^2$

VALUE (units 10^{-9})

EVTS

DOCUMENT ID

TECN

COMMENT

1.2 $^{+0.8}_{-0.7}$ OUR FIT

1.17 ±0.52 ±0.64

3285

²⁴ AKHMETSHIN 00E CMD2 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^+ \pi^-$

- 16 From the combined fit assuming that the total $\phi(1020)$ production cross section is saturated by those of $K^+ K^-$, $K_S K_L$, $\pi^+ \pi^- \pi^0$, and $\eta \gamma$ decays modes and using ACHASOV 00B for the $\eta \gamma$ decay mode.
- 17 Update of AKHMETSHIN 01D
- 18 Recalculated by us from the cross section in the peak.
- 19 From a combined fit of $\sigma(e^+ e^- \rightarrow \eta \gamma)$ with $\eta \rightarrow 3\pi^0$ and $\eta \rightarrow \pi^+ \pi^- \pi^0$, and fixing $B(\eta \rightarrow 3\pi^0)/B(\eta \rightarrow \pi^+ \pi^- \pi^0) = 1.44 \pm 0.04$. Supersedes ACHASOV 00D and ACHASOV 00B. Recalculated by us from the cross section at the peak.
- 20 From the $\eta \rightarrow 2\gamma$ decay and using $B(\eta \rightarrow \gamma\gamma) = 39.43 \pm 0.26\%$.
- 21 From the $\eta \rightarrow 3\pi^0$ decay and using $B(\eta \rightarrow 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$.
- 22 The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively).
- 23 From the $\eta \rightarrow 2\gamma$ decay and using $B(\eta \rightarrow 2\gamma) = (39.21 \pm 0.34) \times 10^{-2}$.
- 24 Recalculated by the authors from the cross section in the peak.
- 25 From the $\eta \rightarrow \pi^+ \pi^- \pi^0$ decay and using $B(\eta \rightarrow \pi^+ \pi^- \pi^0) = (23.1 \pm 0.5) \times 10^{-2}$.
- 26 From the $\pi^0 \rightarrow 2\gamma$ decay and using $B(\pi^0 \rightarrow 2\gamma) = (98.798 \pm 0.032) \times 10^{-2}$.

$\phi(1020)$ BRANCHING RATIOS

$\Gamma(K^+ K^-)/\Gamma_{\text{total}}$

Γ_1/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.493±0.006 OUR FIT	Error includes scale factor of 1.2.			
0.493±0.010 OUR AVERAGE				
0.492±0.012	2913	AKHMETSHIN 95	CMD2	$e^+ e^- \rightarrow K^+ K^-$
0.44 ± 0.05	321	KALBFLEISCH 76	HBC	$2.18 K^- p \rightarrow \Lambda K^+ K^-$
0.49 ± 0.06	270	DEGROOT 74	HBC	$4.2 K^- p \rightarrow \Lambda \phi$
0.540±0.034	565	BALAKIN 71	OSPK	$e^+ e^- \rightarrow K^+ K^-$
0.48 ± 0.04	252	LINDSEY 66	HBC	$2.1-2.7 K^- p \rightarrow \Lambda K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.476±0.017	1000k	27 ACHASOV 01E	SND	$e^+ e^- \rightarrow K^+ K^-$, $K_S K_L$, $\pi^+ \pi^- \pi^0$

$\Gamma(K_L^0 K_S^0)/\Gamma_{\text{total}}$

Γ_2/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.340±0.005 OUR FIT	Error includes scale factor of 1.1.			
0.331±0.009 OUR AVERAGE				
0.335±0.010	40644	AKHMETSHIN 95	CMD2	$e^+ e^- \rightarrow K_L^0 K_S^0$
0.326±0.035		DOLINSKY 91	ND	$e^+ e^- \rightarrow K_L^0 K_S^0$
0.310±0.024		DRUZHININ 84	ND	$e^+ e^- \rightarrow K_L^0 K_S^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.351±0.013	500k	27 ACHASOV 01E	SND	$e^+ e^- \rightarrow K^+ K^-$, $K_S K_L$, $\pi^+ \pi^- \pi^0$
0.27 ± 0.03	133	KALBFLEISCH 76	HBC	$2.18 K^- p \rightarrow \Lambda K_L^0 K_S^0$
0.257±0.030	95	BALAKIN 71	OSPK	$e^+ e^- \rightarrow K_L^0 K_S^0$
0.40 ± 0.04	167	LINDSEY 66	HBC	$2.1-2.7 K^- p \rightarrow \Lambda K_L^0 K_S^0$

$\Gamma(\rho\gamma)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_{15}/Γ
< 0.12	90	47 AKHMETSHIN 99B	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 7	90	AKHMETSHIN 97C	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma$	
<200	84	LINDSEY	66 HBC	$2.1-2.7 K^- p \rightarrow \Lambda \pi^+ \pi^- \text{ neutrals}$	

$\Gamma(e^+ e^-)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_9/Γ
2.98±0.04 OUR FIT		Error includes scale factor of 1.1.			
2.98±0.07 OUR AVERAGE Error includes scale factor of 1.1.					
2.93±0.14	1900k	48 ACHASOV	01E SND	$e^+ e^- \rightarrow K^+ K^-, K_S K_L, \pi^+ \pi^- \pi^0$	
2.88±0.09	55600	AKHMETSHIN 95	CMD2	$e^+ e^- \rightarrow \text{hadrons}$	
3.00±0.21	3681	BUKIN	78C OLYA	$e^+ e^- \rightarrow \text{hadrons}$	
3.10±0.14		49 PARROUR	76 OSPK	$e^+ e^-$	
3.3 ± 0.3		COSME	74 OSPK	$e^+ e^- \rightarrow \text{hadrons}$	
2.81±0.25	681	BALAKIN	71 OSPK	$e^+ e^- \rightarrow \text{hadrons}$	
3.50±0.27		CHATELUS	71 OSPK	$e^+ e^-$	

$\Gamma(\pi^0\gamma)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-3})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_7/Γ
1.31 ±0.13 OUR AVERAGE					
1.30 ± 0.13		DRUZHININ	84 ND	$e^+ e^- \rightarrow 3\gamma$	
1.4 ± 0.5	32	COSME	76 OSPK	$e^+ e^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.258±0.037±0.077	18680	50,51 AKHMETSHIN 05	CMD2	$0.60-1.38 e^+ e^- \rightarrow \pi^0 \gamma$	
1.226±0.036 ^{+0.096} _{-0.089}		52 ACHASOV	00 SND	$e^+ e^- \rightarrow \pi^0 \gamma$	
1.26 ± 0.17		44 BENAYOUN	96 RVUE	$0.54-1.04 e^+ e^- \rightarrow \pi^0 \gamma$	

$\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_{12}/Γ
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.71±0.11±0.09		28 ACHASOV	00C SND	$e^+ e^- \rightarrow \pi^+ \pi^-$	
0.65 ^{+0.38} _{-0.29}		28 GOLUBEV	86 ND	$e^+ e^- \rightarrow \pi^+ \pi^-$	
2.01 ^{+1.07} _{-0.84}		28 VASSERMAN	81 OLYA	$e^+ e^- \rightarrow \pi^+ \pi^-$	
<6.6	95	BUKIN	78B OLYA	$e^+ e^- \rightarrow \pi^+ \pi^-$	
<2.7	95	ALVENSLEB...	72 CNTR	$6.7 \gamma C \rightarrow C \pi^+ \pi^-$	

$\Gamma(\omega\pi^0)/\Gamma_{\text{total}}$

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT	Γ_{13}/Γ
5.2$^{+1.3}_{-1.1}$	53,54 AULCHENKO 00A SND	e ⁺ e ⁻ → $\pi^+\pi^-\pi^0\pi^0$		
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 5.4	55 ACHASOV 00E SND	e ⁺ e ⁻ → $\pi^0\pi^0\gamma$		
$5.5^{+1.6}_{-1.4} \pm 0.3$	54,56 AULCHENKO 00A SND	e ⁺ e ⁻ → $\pi^+\pi^-\pi^0\pi^0$		
$4.8^{+1.9}_{-1.7} \pm 0.8$	55 ACHASOV 99 SND	e ⁺ e ⁻ → $\pi^+\pi^-\pi^0\pi^0$		

$\Gamma(K_L^0 K_S^0)/\Gamma(K^+ K^-)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_2/Γ_1
0.690± 0.017 OUR FIT		Error includes scale factor of 1.1.			
0.740± 0.031 OUR AVERAGE					
0.70 ± 0.06	2732	BUKIN 78C OLYA	e ⁺ e ⁻ → $K_L^0 K_S^0$		
0.82 ± 0.08		LOSTY 78 HBC	$4.2 K^- p \rightarrow \phi$ hyperon		
0.71 ± 0.05		LAVEN 77 HBC	$10 K^- p \rightarrow K^+ K^- \Lambda$		
0.71 ± 0.08		LYONS 77 HBC	$3-4 K^- p \rightarrow \Lambda\phi$		
0.89 ± 0.10	144	AGUILAR-... 72B HBC	$3.9, 4.6 K^- p$		
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.68 ± 0.03		57 AKHMETSHIN 95 CMD2	e ⁺ e ⁻ → $K_L^0 K_S^0, K^+ K^-$		

$[\Gamma(\rho\pi) + \Gamma(\pi^+\pi^-\pi^0)]/\Gamma(K^+ K^-)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_3/Γ_1
0.309± 0.010 OUR FIT		Error includes scale factor of 1.2.			
0.28 ± 0.09	34	AGUILAR-... 72B HBC	$3.9, 4.6 K^- p$		

$\Gamma(\eta e^+ e^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_{11}/Γ
1.15± 0.10 OUR AVERAGE					
1.19 ± 0.19 ± 0.12	213	58 ACHASOV 01B SND	e ⁺ e ⁻ → $\gamma\gamma e^+e^-$		
1.14 ± 0.10 ± 0.06	355	59 AKHMETSHIN 01 CMD2	e ⁺ e ⁻ → ηe^+e^-		
$1.3^{+0.8}_{-0.6}$	7	GOLUBEV 85 ND	e ⁺ e ⁻ → $\gamma\gamma e^+e^-$		
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.13 ± 0.14 ± 0.07	183	60 AKHMETSHIN 01 CMD2	e ⁺ e ⁻ → ηe^+e^-		
1.21 ± 0.14 ± 0.09	130	61 AKHMETSHIN 01 CMD2	e ⁺ e ⁻ → ηe^+e^-		
1.04 ± 0.20 ± 0.08	42	62 AKHMETSHIN 01 CMD2	e ⁺ e ⁻ → ηe^+e^-		

$\Gamma(\eta'(958)\gamma)/\Gamma_{\text{total}}$

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_{24}/Γ
6.23± 0.21 OUR FIT						
6.23± 0.30 OUR AVERAGE						
6.23 ± 0.27 ± 0.12		3407	63 AMBROSINO 07A KLOE	$1.02 e^+e^- \rightarrow \pi^+\pi^- 7\gamma$		
$6.7^{+2.8}_{-2.4} \pm 0.8$		12	64 AULCHENKO 03B SND	$e^+e^- \rightarrow \eta'\gamma$		

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-5})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 1.8	90	AKHMETSHIN 00E	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^+ \pi^- \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<30	90	AKHMETSHIN 98	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma\gamma$

 Γ_{28}/Γ $\Gamma(\eta\mu^+\mu^-)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-6})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<9.4	90	AKHMETSHIN 01	CMD2	$e^+ e^- \rightarrow \eta e^+ e^-$

 Γ_{29}/Γ $\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$

<u>VALUE</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$\simeq 0.0087$		1.98M	94,95 ALOISIO	03	KLOE $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
<0.0006	90	96	ACHASOV	02	SND $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
<0.23	90	96	CORDIER	80	DM1 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
<0.20	90	96	PARROUR	76B	OSPK $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$

27 Using $B(\phi \rightarrow e^+ e^-) = (2.93 \pm 0.14) \times 10^{-4}$.28 Using $B(\phi \rightarrow e^+ e^-) = (2.99 \pm 0.08) \times 10^{-4}$.29 Using $\Gamma(\phi) = 4.1$ Mev. If interference between the $\rho\pi$ and 3π modes is neglected, the fraction of the $\rho\pi$ is more than 80% at the 90% confidence level.

30 Neglecting interference between resonance and continuum.

31 Using $B(\phi \rightarrow e^+ e^-) = (2.91 \pm 0.07) \times 10^{-4}$.32 Recalculated by us using $B(\phi \rightarrow e^+ e^-) = (2.99 \pm 0.08) \times 10^{-4}$.33 Using $B(\phi \rightarrow e^+ e^-) = (2.99 \pm 0.08) \times 10^{-4}$ and $B(\eta \rightarrow 3\pi^0) = (32.2 \pm 0.4) \times 10^{-2}$.34 From $\pi^+ \pi^- \pi^0$ decay mode of η .35 From 2γ decay mode of η .36 From $3\pi^0$ decay mode of η .37 Using $B(\phi \rightarrow e^+ e^-) = (2.98 \pm 0.04) \times 10^{-4}$.38 Using $B(\phi \rightarrow e^+ e^-) = (2.98 \pm 0.04) \times 10^{-4}$ and $B(\eta \rightarrow \gamma\gamma) = 39.43 \pm 0.26\%$.39 Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}^2$.40 Using $B(\phi \rightarrow e^+ e^-) = (2.99 \pm 0.08) \times 10^{-4}$ and $B(\eta \rightarrow 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$.41 The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively).42 From the $\eta \rightarrow 2\gamma$ decay and using $B(\phi \rightarrow e^+ e^-) = (2.99 \pm 0.08) \times 10^{-4}$.43 From $\pi^+ \pi^- \pi^0$ decay mode of η and using $B(\phi \rightarrow e^+ e^-) = (2.99 \pm 0.08) \times 10^{-4}$.

44 Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution.

45 For $E_\gamma > 20$ MeV and assuming that $B(\phi(1020) \rightarrow f_0(980)\gamma)$ is negligible. Supersedes AKHMETSHIN 97C.46 For $E_\gamma > 20$ MeV and assuming that $B(\phi(1020) \rightarrow f_0(980)\gamma)$ is negligible.

47 Supersedes AKHMETSHIN 97C.

48 From the combined fit assuming that the total $\phi(1020)$ production cross section is saturated by those of $K^+ K^-$, $K_S K_L$, $\pi^+ \pi^- \pi^0$, and $\eta\gamma$ decays modes and using ACHASOV 00B for the $\eta\gamma$ decay mode.49 Using total width 4.2 MeV. They detect 3π mode and observe significant interference with ω tail. This is accounted for in the result quoted above.

- 50 Using $B(\phi \rightarrow e^+ e^-) = (2.98 \pm 0.04) \times 10^{-4}$.
- 51 Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\pi^0 \gamma) / \Gamma_{\text{total}}^2$.
- 52 From the $\pi^0 \rightarrow 2\gamma$ decay and using $B(\phi \rightarrow e^+ e^-) = (2.99 \pm 0.08) \times 10^{-4}$.
- 53 Using the 1996 and 1998 data.
- 54 $(2.3 \pm 0.3)\%$ correction for other decay modes of the $\omega(782)$ applied.
- 55 Using the 1996 data.
- 56 Using the 1998 data.
- 57 Theoretical analysis of BRAMON 00 taking into account phase-space difference, electromagnetic radiative corrections, as well as isospin breaking, predicts 0.62. FISCHBACH 02 calculates additional corrections caused by the close threshold and predicts 0.68.
- 58 Using $B(\eta \rightarrow \gamma\gamma) = (39.25 \pm 0.32)\%$, $B(\phi \rightarrow \eta\gamma) = (1.26 \pm 0.06)\%$, and $B(\phi \rightarrow e^+ e^-) = (3.00 \pm 0.06) \times 10^{-4}$.
- 59 The average of the branching ratios separately obtained from the $\eta \rightarrow \gamma\gamma$, $3\pi^0$, $\pi^+\pi^-\pi^0$ decays.
- 60 From $\eta \rightarrow \gamma\gamma$ decays and using $B(\eta \rightarrow \gamma\gamma) = (39.33 \pm 0.25) \times 10^{-2}$, $B(\eta \rightarrow \pi^+\pi^-\gamma) = (4.75 \pm 11) \times 10^{-2}$, and $B(\phi \rightarrow \eta\gamma) = (1.297 \pm 0.033) \times 10^{-2}$.
- 61 From $\eta \rightarrow 3\pi^0$ decays and using $B(\pi^0 \rightarrow \gamma\gamma) = (98.798 \pm 0.033) \times 10^{-2}$, $B(\eta \rightarrow 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$, $B(\eta \rightarrow \pi^+\pi^-\gamma) = (4.75 \pm 0.11) \times 10^{-2}$, and $B(\phi \rightarrow \eta\gamma) = (1.297 \pm 0.033) \times 10^{-2}$.
- 62 From $\eta \rightarrow \pi^+\pi^-\pi^0$ decays and using $B(\pi^0 \rightarrow \gamma\gamma) = (98.798 \pm 0.033) \times 10^{-2}$, $B(\pi^0 \rightarrow e^+e^-\gamma) = (1.198 \pm 0.032) \times 10^{-2}$, $B(\eta \rightarrow \pi^+\pi^-\pi^0) = (23.0 \pm 0.4) \times 10^{-2}$, $B(\phi \rightarrow \pi^+\pi^-\pi^0) = (15.5 \pm 0.6) \times 10^{-2}$, and $B(\phi \rightarrow \eta\gamma) = (1.297 \pm 0.033) \times 10^{-2}$.
- 63 AMBROSINO 07A reports $[B(\phi(1020) \rightarrow \eta'(958)\gamma) / B(\phi(1020) \rightarrow \eta\gamma)] = (4.77 \pm 0.09 \pm 0.19) \times 10^{-3}$. We multiply by our best value $B(\phi(1020) \rightarrow \eta\gamma) = (1.305 \pm 0.025) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 64 Averaging AULCHENKO 03B with AULCHENKO 99.
- 65 Using $B(\phi \rightarrow \eta\gamma) = (1.297 \pm 0.033)\%$.
- 66 Using the value $B(\phi \rightarrow \eta\gamma) = (1.26 \pm 0.06) \times 10^{-2}$.
- 67 Using $B(\phi \rightarrow K_L^0 K_S^0) = (33.8 \pm 0.6)\%$.
- 68 Averaging AKHMETSHIN 00B with AKHMETSHIN 00F.
- 69 Using the value $B(\eta' \rightarrow \eta\pi^+\pi^-) = (43.7 \pm 1.5) \times 10^{-2}$ and $B(\eta \rightarrow \gamma\gamma) = (39.25 \pm 0.31) \times 10^{-2}$.
- 70 Using the value $B(\phi \rightarrow \eta\gamma) = (1.338 \pm 0.053) \times 10^{-2}$.
- 71 Supersedes ACHASOV 98I. Excluding $\omega\pi^0$.
- 72 Supersedes ALOISIO 02D.
- 73 From the combined fit of the photon spectra in the reactions $e^+e^- \rightarrow \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$.
- 74 From the negative interference with the $f_0(600)$ meson of AITALA 01B using the ACHASOV 89 parameterization for the $f_0(980)$, a Breit-Wigner for the $f_0(600)$, and ACHASOV 01F for the $\rho\pi$ contribution.
- 75 Assuming that the $\pi^0\pi^0\gamma$ final state is completely determined by the $f_0\gamma$ mechanism, neglecting the decay $B(\phi \rightarrow K\bar{K}\gamma)$ and using $B(f_0 \rightarrow \pi^+\pi^-) = 2B(f_0 \rightarrow \pi^0\pi^0)$.
- 76 For $E_\gamma > 20$ MeV. Supersedes AKHMETSHIN 97C.
- 77 Neglecting other intermediate mechanisms ($\rho\pi$, $\sigma\gamma$).
- 78 A narrow pole fit taking into account $f_0(980)$ and $f_0(1200)$ intermediate mechanisms.
- 79 For destructive interference with the Bremsstrahlung process
- 80 For constructive interference with the Bremsstrahlung process
- 81 Using various branching ratios from the 2000 Edition of this Review (PDG 00).

- 82 Using $B(\pi^0 \rightarrow \gamma\gamma) = 0.98798 \pm 0.00032$, $B(\phi \rightarrow \eta\gamma) = (1.297 \pm 0.033) \times 10^{-2}$,
and $B(\eta \rightarrow \pi^+\pi^-\gamma) = (4.75 \pm 0.11) \times 10^{-2}$.
- 83 From the decay mode $\eta \rightarrow \gamma\gamma$.
- 84 From the decay mode $\eta \rightarrow \pi^+\pi^-\pi^0$.
- 85 Supersedes ACHASOV 98B.
- 86 Using $M_{a_0(980)} = 984.8$ MeV and assuming $a_0(980)\gamma$ dominance.
- 87 Assuming $a_0(980)\gamma$ dominance in the $\eta\pi^0\gamma$ final state.
- 88 Using data of ACHASOV 00F.
- 89 Using results of ALOISIO 02D and assuming that $f_0(980)$ decays into $\pi\pi$ only and $a_0(980)$ into $\eta\pi$ only.
- 90 Using various branching ratios of K_S^0 , K_L^0 , η , η' from the 2000 edition (The European Physical Journal **C15** 1 (2000)) of this Review.
- 91 From the decay mode $\eta' \rightarrow \eta\pi^+\pi^-$, $\eta \rightarrow \gamma\gamma$.
- 92 Superseded by AKHMETSHIN 00B.
- 93 For $E_\gamma > 20$ MeV.
- 94 From a fit without limitations on charged and neutral ρ masses and widths.
- 95 Adding the direct and $\omega\pi$ contributions and considering the interference between the $\rho\pi$ and $\pi^+\pi^-\pi^0$.
- 96 Neglecting the interference between the $\rho\pi$ and $\pi^+\pi^-\pi^0$.

$\pi^+\pi^-\pi^0 / \rho\pi$ AMPLITUDE RATIO a_1 IN DECAY OF $\phi \rightarrow \pi^+\pi^-\pi^0$

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
9.1±1.2 OUR AVERAGE					
10.1±4.4±1.7	80k	97	AKHMETSHIN 06	CMD2	$1.017 - 1.021 e^+e^- \rightarrow \pi^+\pi^-\pi^0$
9.0±1.1±0.6	1.98M	98,99	ALOISIO	03	$1.02 e^+e^- \rightarrow \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$-6 < a_1 < 6$	500k	99	ACHASOV	02	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
$-16 < a_1 < 11$	90	9.8k	97,100	AKHMETSHIN 98	$e^+e^- \rightarrow \pi^+\pi^-\gamma\gamma$
97 Dalitz plot analysis taking into account interference between the contact and $\rho\pi$ amplitudes.					
98 From a fit without limitations on charged and neutral ρ masses and widths.					
99 Recalculated by us to match the notations of AKHMETSHIN 98.					
100 Assuming zero phase for the contact term.					

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AYRES	74	PRL 32 1463	D.S. Ayres <i>et al.</i>	(ANL)
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